

2.6 Prove Statements about Segments and Angles

Proof—a logical argument that shows a statement is true

Theorem—a statement that can be proven

Examples of how these are used.

Give the reason for the conclusions below.

1. Given: M is the midpoint \overline{AB}

Conclusion: $AM = MB$ $\overline{AM} \cong \overline{MB}$

Reason: def of midpt.



2. Given: diagram to the right

Conclusion: $CA + AT = CT$

Reason: Segment Add. Post. (S.A.P.)



3. Given: diagram

Conclusion: $m\angle ABD + m\angle DBC = m\angle ABC$

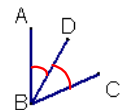
Reason: Angle Add. Post (A.A.P.)



4. Given: \overrightarrow{BD} bisects $\angle ABC$

Conclusion: $m\angle ABD = m\angle DBC$

Reason: def. of Angle Bisector

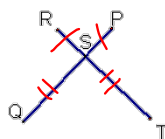


5. Given: $\overline{AB} \cong \overline{CD}$

Conclusion: $AB = CD$

Reason: def of \cong

Example 1

Given: $RS = PS$; $ST = SQ$ Prove: $RT = PQ$ 

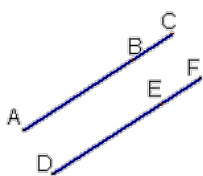
Statements	Reasons
① $RS = PS$; $ST = SQ$	① Given
② $RS + ST = PS + SQ$	② Addition
③ $RS + ST = RT$ $PS + SQ = PQ$	③ S.A.P
④ $RT = PQ$	④ Subst.

Example 2

Given: $LM = NO$ Prove: $LN \cong MO$ 

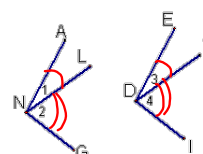
Statements	Reasons
① $LM = NO$	① Given
② $MN = MN$	② Refl.
③ $LM + MN = NO + MN$	③ Addition
④ $LM + MN = LN$ $NO + MN = MO$	④ S.A.P.
⑤ $LN = MO$	⑤ Subst.
⑥ $\overline{LN} \cong \overline{MO}$	⑥ def of \cong

DO:

Given: $AB = DE$; $BC = EF$ Prove: $AC = DF$ 

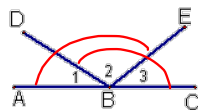
Statements	Reasons

EXAMPLE 3:

Given: $m\angle 1 = m\angle 3$; $m\angle 2 = m\angle 4$ Prove: $m\angle ANG = m\angle EDI$ 

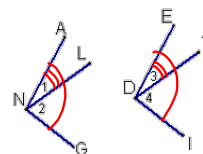
Statements	Reasons
① $m\angle 1 = m\angle 3$ $m\angle 2 = m\angle 4$	① Given
② $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	② Addition
③ $m\angle 1 + m\angle 2 = m\angle ANG$ $m\angle 3 + m\angle 4 = m\angle EDI$	③ A. A. P.
④ $m\angle ANG = m\angle EDI$	④ Subst.

EXAMPLE 4:

Given: $m\angle ABE = m\angle DBC$ Prove: $m\angle 1 = m\angle 3$ 

Statements	Reasons
① $m\angle ABE = m\angle DBC$	① Given
② $m\angle ABE = m\angle 1 + m\angle 2$ $m\angle DBC = m\angle 2 + m\angle 3$	② A.P.
③ $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	③ Subst.
④ $m\angle 2 = m\angle 2$	④ Reflexive
⑤ $m\angle 1 = m\angle 3$	⑤ Subtr.

EXAMPLE 5:

Given: $m\angle ANG = m\angle EDI$; $m\angle 1 = m\angle 3$ Prove: $m\angle 2 = m\angle 4$ 

Statements	Reasons
① $m\angle ANG = m\angle EDI$ $m\angle 1 = m\angle 3$	① Given
② $m\angle ANG = m\angle 1 + m\angle 2$ $m\angle EDI = m\angle 3 + m\angle 4$	② A.A.P.
③ $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	③ Subst.
③ $m\angle 1 = m\angle 3$	③ Given
④ $m\angle 2 = m\angle 4$	④ Subtr.

HW see new homework handout